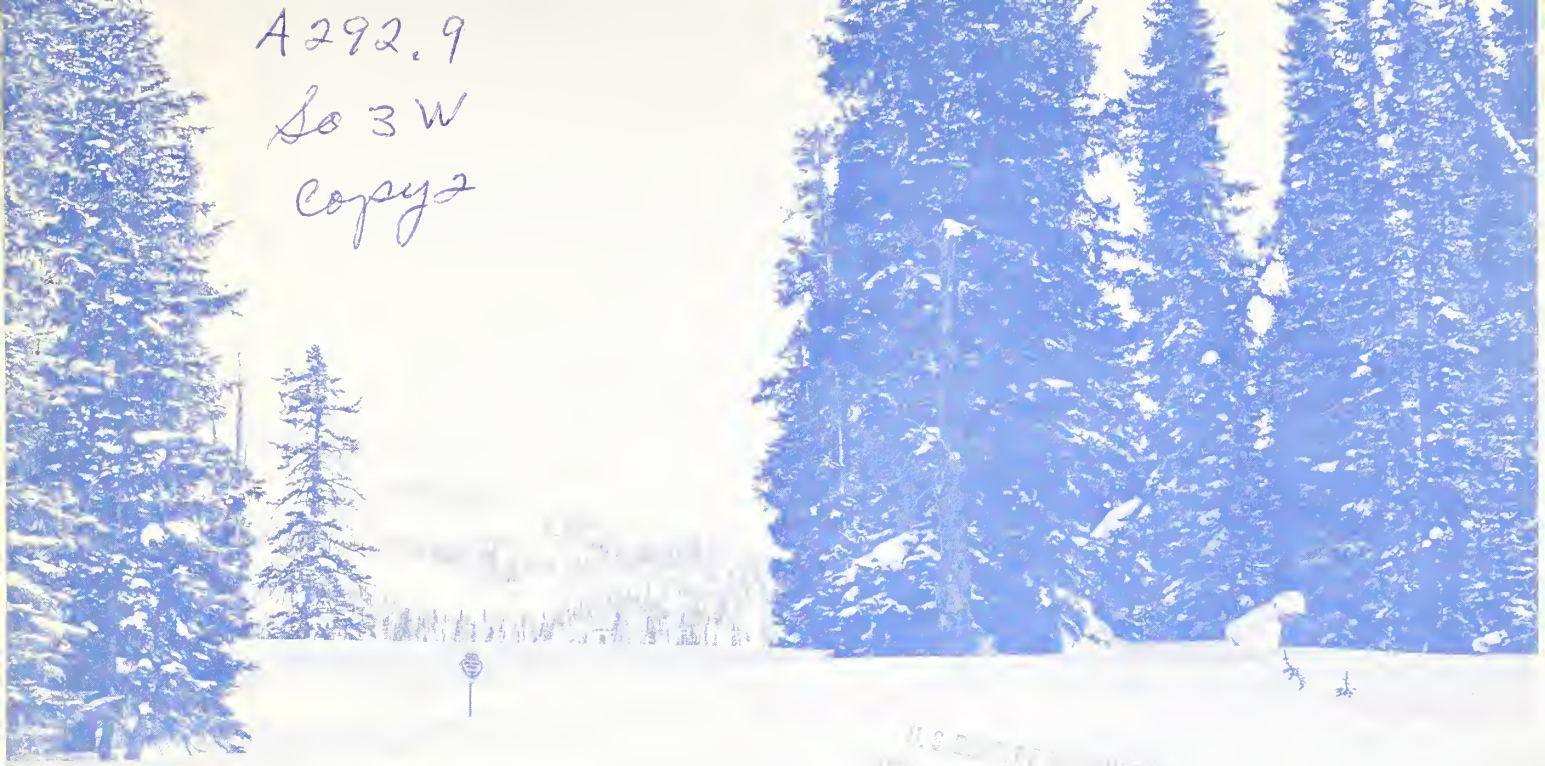


WATER SUPPLY OUTLOOK FOR WESTERN UNITED STATES

Including Columbia River Drainage in Canada

and

FEDERAL - STATE - PRIVATE COOPERATIVE SNOW SURVEYS

UNITED STATES DEPARTMENT of AGRICULTURE···SOIL CONSERVATION SERVICE
Collaborating with
CALIFORNIA DEPARTMENT of WATER RESOURCES
and
BRITISH COLUMBIA DEPARTMENT of
LANDS, FORESTS and WATER RESOURCES

AS OF
APR. 1, 1968

TO RECIPIENTS OF WATER SUPPLY OUTLOOK REPORTS:

Most of the usable water in western states originates as mountain snowfall. This snowfall accumulates during the winter and spring, several months before the snow melts and appears as streamflow. Since the runoff from precipitation as snow is delayed, estimates of snowmelt runoff can be made well in advance of its occurrence. Streamflow forecasts published in this report are based principally on measurement of the water equivalent of the mountain snowpack.

Forecasts become more accurate as more of the data affecting runoff are measured. All forecasts assume that climatic factors during the remainder of the snow accumulation and melt season as they affect runoff will add to be an effective average. Early season forecasts are therefore subject to a greater change than those made on later dates.

The snow course measurement is obtained by sampling snow depth and water equivalent at surveyed and marked locations in mountain areas. A total of about ten samples are taken at each location. The average of these are reported as snow depth and water equivalent. These measurements are repeated in the same location near the same dates each year.

Snow surveys are made monthly or semi-monthly from January 1 through June 1 in most states. There are about 1400 snow courses in Western United States and in the Columbia Basin in British Columbia. In the near future, it is anticipated that automatic snow water equivalent sensing devices along with radio telemetry will provide a continuous record of snow water equivalent at key locations.

Detailed data on snow course and soil moisture measurements are presented in state and local reports. Other data or reservoir storage, summaries of precipitation, current streamflow, and soil moisture conditions at valley elevations are also included. The report for Western United States presents a broad picture of water supply outlook conditions, including selected streamflow forecasts, summary of snow accumulation to date, and storage in larger reservoirs.

Snow survey and soil moisture data for the period of record are published by the Soil Conservation Service by states about every five years. Data for the current year is summarized in a West-wide basic data summary and published about October 1 of each year.

PUBLISHED BY SOIL CONSERVATION SERVICE

D. A. WILLIAMS, Administrator

The Soil Conservation Service publishes reports following the principal snow survey dates from January 1 through June 1 in cooperation with state water administrators, agricultural experiment stations and others. Copies of the reports for Western United States and all state reports may be obtained from Soil Conservation Service, Western Regional Technical Service Center, Room 507, 701 N. W. Glisan, Portland, Oregon 97209.

Copies of state and local reports may also be obtained from state offices of the Soil Conservation Service in the following states:

STATE	ADDRESS
Alaska	P. O. Box "F", Palmer, Alaska 99645
Arizona	6029 Federal Building, Phoenix, Arizona 85205
Colorado (N. Mex.)	12417 Federal Building, Denver, Colorado 80202
Idaho	P. O. Box 38, Boise, Idaho 83707
Montana	P. O. Box 98, Bozeman, Montana 59715
Nevada	P. O. Box 4850, Reno Nevada 89505
Oregon	1218 S. W. Washington St., Portland, Oregon 97205
Utah	4012 Federal Building, Salt Lake City, Utah 84111
Washington	360 Federal Office Building, Spokane, Washington 99201
Wyoming	P. O. Box 340, Casper, Wyoming 82602

PUBLISHED BY OTHER AGENCIES

Water Supply Outlook reports prepared by other agencies include a report for California by the Water Supply Forecast and Snow Surveys Unit, California Department of Water Resources, P. O. Box 388, Sacramento, California 95802 --- and for British Columbia by the Department of Lands, Forests and Water Resources, Water Resources Service, Parliament Building, Victoria, British Columbia

USDA-SCS-PORTLAND, OREG. 1966

WATER SUPPLY OUTLOOK FOR WESTERN UNITED STATES

Including Columbia River Drainage in Canada

ISSUED

APRIL 1, 1968

The Soil Conservation Service coordinates snow surveys conducted by its staff and many cooperators, including the Bureau of Reclamation, Corps of Engineers, Forest Service, National Park Service, Weather Bureau, Geological Survey, and other Federal Agencies, Departments of State Government, Irrigation Districts, Power Companies, and others.

The Department of Water Resources coordinates snow surveys in California.

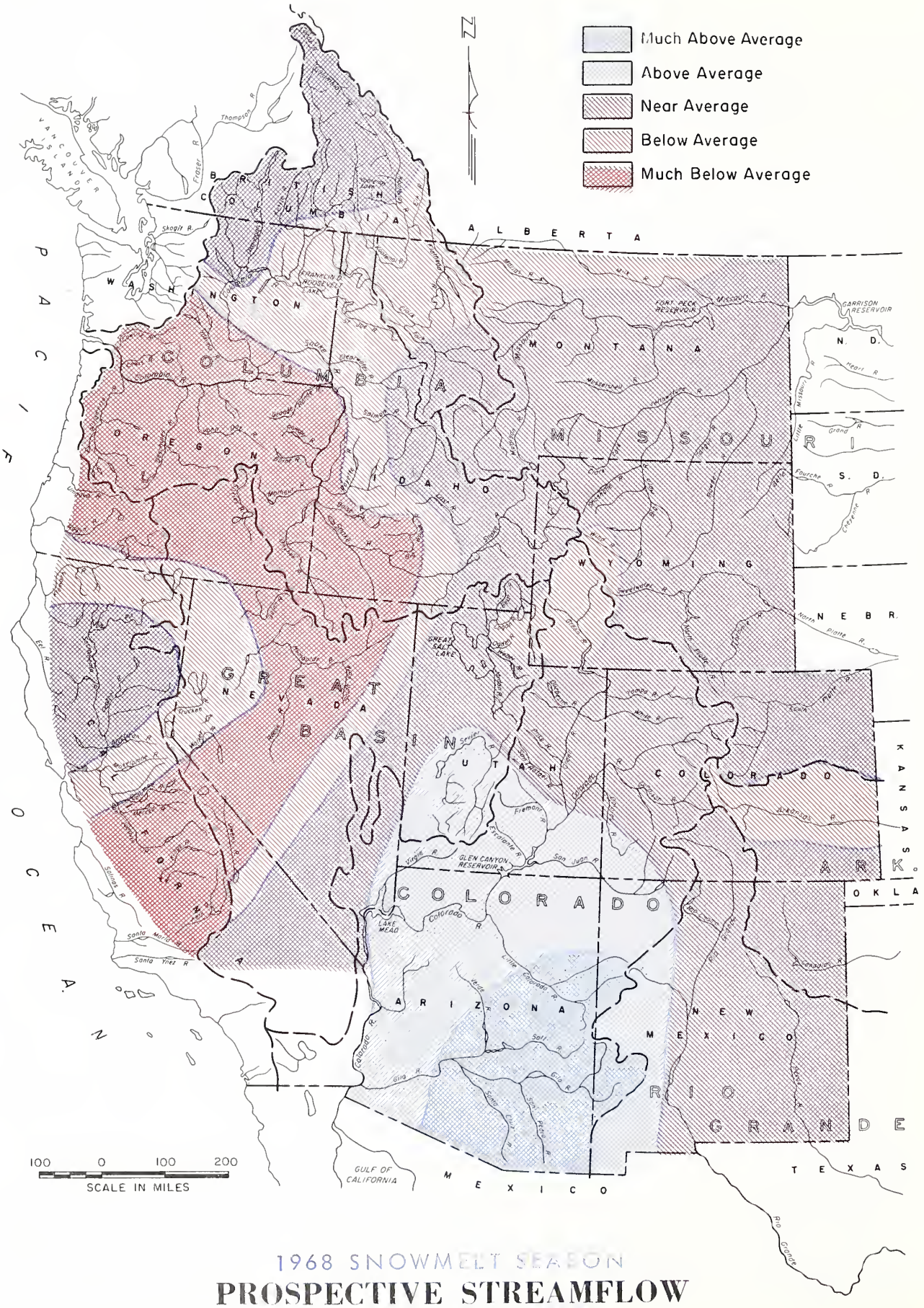
The Water Resources Service, Department of Lands, Forests, and Water Resources directs snow surveys in British Columbia.

This report was prepared by the Water Supply Forecasting Branch, Engineering Division, Soil Conservation Service, from data supplied by Snow Survey Supervisors of the Soil Conservation Service in the States of Alaska, Arizona, Colorado and New Mexico, Idaho, Montana, Nevada, Oregon, Utah, Washington, and Wyoming.

Data from California was supplied by the Chief, Water Supply Forecast and Snow Survey Unit, Department of Water Resources.

Data from British Columbia was supplied by the Chief, Hydrology Division, Water Investigations Branch, Department of Lands, Forests and Water Resources.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
D. A. WILLIAMS, ADMINISTRATOR



1968 SNOWMELT SEASON

PROSPECTIVE STREAMFLOW

AS OF APRIL 1, 1968

WATER SUPPLY OUTLOOK

1968 SNOWMELT SEASON
AS OF APRIL 1, 1968

WATER SUPPLY FOR IRRIGATION PURPOSES WILL BE REASONABLY SATISFACTORY FOR MOST WESTERN AREAS IN 1968. SEVERE SHORTAGES ARE IN PROSPECT FOR MUCH OF OREGON, SOUTHWEST IDAHO AND ADJACENT AREAS OF NEVADA. STREAMFLOW WILL BE BELOW AVERAGE IN WEST COAST STATES. SOME SHORTAGES MAY OCCUR IN CENTRAL VALLEY OF CALIFORNIA.

Except for the Central Valley of Arizona, snowmelt season streamflow will be less than average for most western streams in 1968. The variation in streamflow forecasts is substantial. In general, near average flow is forecast for the Rocky Mountain area. There is a gradual decline toward the west coast states where many smaller streams in Oregon, Nevada and California are forecast at less than half of average. The deficiency on some watersheds in Oregon will result in short water supplies for up to two-thirds of the irrigated area of the state. Other areas of prospective shortage include the southern tributaries of the Snake in Idaho and the Humboldt in Nevada. Some degree of shortage will likely occur along the Arkansas in Colorado and the Rio Grande in New Mexico principally due to lack of carryover storage and heavy demands as compared to a normal surface water supply.

Streamflow was well above average in 1967 especially on streams in British Columbia and those originating in the central and southern Sierras of California and Nevada. In these areas, the high streamflow maintained or improved the water storage situation. This above average irrigation water storage extends to a lesser degree into Montana and western Wyoming, the larger tributaries of the Snake River in Idaho and the Great Basin streams in Utah. Storage will tend to alleviate streamflow shortages in many areas including the Yakima in Washington, the Boise and Payette in southwestern Idaho, the Owyhee in Oregon and particularly in the major agricultural area of the San Joaquin Valley in California.

A third year of extremely favorable surface water supply is in prospect for Arizona although the outlook for the Verde has declined in recent weeks. Reservoir storage is near maximum of record on the Salt and Gila rivers. Heavy snow remains at higher elevations on the Gila, Salt and Little Colorado rivers.

March snowfall on the Colorado River Basin tended to be deficient in March so the inflow to Lake Powell and the flow of tributary streams is forecast at slightly below average in 1968. Storage in major reservoirs remains about the same as a year ago at slightly less than half of total capacity. Water supplies for irrigation should be satisfactory on tributaries in Colorado and Utah.

For the Missouri Basin, the flow of the main Missouri and Yellowstone rivers will be above average through Montana. Some deficiency in streamflow is expected on the northern tributaries to the Missouri including the Sun, Teton, Milk and Marias rivers; but no material water shortage is expected. Similar prospects exist for the Powell Basin in Wyoming. There may be some late season shortage on upper Wind River tributaries in Wyoming. The flow of the North Platte serving eastern Wyoming and western Nebraska will be near average. South Platte tributaries will also have near average flows. Forecasts for these two streams may be somewhat higher than shown in the tables because of heavy snow which came in early April. Storage and prospective streamflow will meet normal summer demands in the Missouri Basin.

If summer demands are average or higher, there will be a substantial shortage on the Arkansas in Colorado. Both carryover reservoir storage and mountain snowpack are below average. Snowpack in the Rio Grande drainage in Colorado and New Mexico tends to be slightly above average except at the highest mountain elevations and in the headwaters of the Chama.

The California Department of Water Resources reports that with below normal precipitation in the mountainous areas during March, normal snowpack accumulation was again not realized. Thus, the state's April-July runoff potential was again set back. Storage in major reservoirs is still above normal in all areas.

SUMMARY OF SNOW WATER EQUIVALENT MEASUREMENTS APRIL 1, 1968

MAJOR BASIN AND SUB—WATERSHED	WATER EQUIVALENT IN PERCENT OF: LAST YEAR	AVERAGE
MISSOURI BASIN		
Jefferson	90	106
Madison	81	95
Gallatin	97	122
Missouri Main Stem	90	120
Yellowstone	84	105
Shoshone	75	75
Wind	85	95
North Platte	100	100
South Platte	110	90
ARKANSAS BASIN		
Arkansas	130	100
Canadian	280	135
RIO GRANDE BASIN		
Rio Grande (Colo.)	145	110
Rio Grande abv. Otowi Bridge	145	105
Pecos	300+	180
COLORADO BASIN		
Green (Wyo.)	55	60
Yampa - White	115	95
Duchesne	94	92
Price	113	99
Upper Colorado	110	100
Gunnison	130	100
San Juan	130	95
Dolores	145	110
Virgin	240	115
Gila	300+	300+
Salt	300+	200
GREAT BASIN		
Bear	99	91
Logan	86	88
Ogden	118	80
Weber	111	91
Provo - Utah Lake	131	95
Jordan	110	94
Sevier	236	110
Walker - Carson	50	70
Tahoe - Truckee	60	75
Humboldt	55	45
Lake Co. (Oregon)	35	30
Harney Basin (Oregon)	30	30
UPPER COLUMBIA BASIN		
Columbia (Canada)	80	120
Kootenai	55	80
Clark Fork	80	90
Bitterroot	79	83
Flathead	65	80
Spokane	70	50
Okanogan	80	95
Methow	90	100
Chelan	85	90
Wenatchee	65	55

MAJOR BASIN AND SUB—WATERSHED	WATER EQUIVALENT IN PERCENT OF: LAST YEAR	AVERAGE
SNAKE BASIN		
Snake above Jackson, Wyo.	80	85
Snake above Hiese, Idaho	85	90
Snake abv. American Falls Res.	80	90
Henry's Fork	70	90
Southern Idaho Tributaries	85	75
Big and Little Wood	65	70
Boise	65	60
Owyhee	30	20
Payette	65	70
Malheur	40	35
Weiser	75	75
Burnt	--	20
Powder	--	30
Salmon	70	75
Grande Ronde	45	40
Clearwater	65	60
LOWER COLUMBIA BASIN		
Yakima	55	50
Umatilla	15	10
John Day	20	20
Deschutes	50	45
Crocked	10	10
Hood	35	25
Willamette	50	40
Lewis	50	50
Cowlitz	55	55
PACIFIC COASTAL BASIN		
Puget Sound	40	45
Olympic Peninsula	60	70
Umpqua - Rogue	50	45
Klamath	45	40
Trinity	80	85
CALIFORNIA CENTRAL VALLEY		
Upper Sacramento	60	80
Feather	70	90
Yuba	70	85
American	60	75
Mokelumne	60	70
Stanislaus	55	70
Tuolumne	60	75
Merced	60	65
San Joaquin	40	55
Kings	45	60
Kaweah	60	70
Tule	45	40
Kern	45	65

Data for California Watersheds supplied by Dept. of Water Resources, and for British Columbia Watersheds by Dept. of Lands, Forests and Water Resources.

Average is for 1948-62 period. California averages are for 1931-1960.
Based on Selected Snow Courses determined by Distribution within the Basin, Length of Record and Repetitive Monthly Measurement Schedules.

Although no critical water shortages are anticipated this year, some curtailment of deliveries may be required, especially in the San Joaquin Valley.

Seasonal snowfall has been near average in the British Columbia section of the Columbia River Basin with a substantial variation relative to elevation. Snowfall tends to be deficient at medium elevations on the Columbia and at all elevations on the Kootenai. The deficiency in snowfall and streamflow forecasts on Snake River watersheds and elsewhere in the lower basin reduces the prospective snowmelt season flow at The Dalles, Oregon to 87 percent of average.

ARKANSAS BASIN

With a continued deficiency in mountain snowfall on the main Arkansas in Colorado since mid-winter some water shortages are expected in this area. Forecasts are in the three-quarters of average range. Storage in all reservoirs including John Martin is at a low level. Much more precipitation as snow or rainfall is needed to assure an adequate water supply in 1968.

For the Canadian in New Mexico, snowmelt runoff should be slightly above average. Storage on the Tucumcari Project is near average and will meet minimum nedds. Any excess of water depends on spring and summer rainfall.

MISSOURI BASIN

Water supplies will be satisfactory on the upper Missouri and its tributaries. Major reservoirs on the main river in Montana and the Dakotas have stored water in excess of average and that of a year ago. Snow cover is near average in the watersheds of the Madison, Jefferson and Yellowstone, above average on the Gallatin and Missouri tributaries near Helena and below average on the Sun-Marias-Teton drainages.

In Wyoming, snowmelt season flow forecasts are near average except for below average flows on the Green River tributary to the Colorado, and above average for smaller streams on both sides of the Big Horn Mountains. In the Powell Basin, storage is slightly less than average, but water supplies will be satisfactory. Some shortages may occur on small tributaries if the summer rainfall is deficient.

Storage in and inflow prospects to the North Platte reservoirs systems will be near average and adequate to meet irrigation water demands. Inflow to Seminoe Reservoir is not expected to be enough to fill the reservoir at any time during snowmelt. The outlook for water along the Laramie is not as favorable as for the North Platte, mostly due to lack of storage. There were heavy storms in early April which will probably increase streamflow forecasts on this watershed.

March snowfall was deficient over the South Platte watershed in Colorado. Forecasts of streamflow were lowered to 90 percent of average. Storage in Colorado-Big Thompson as well as smaller irrigation reservoirs is near average. Storage in municipal reservoirs is well above average and slightly above a year ago. Total water supply will be adequate to meet normal demands.

RIO GRANDE BASIN

Streamflow prospects on the Rio Grande in Colorado and northern New Mexico are slightly above average and well above that for 1967. However, water supply outlook can be considered as only average in Colorado and poor in New Mexico. Storage in major reservoirs in New Mexico is far below average and capacity but comparable to recent years. Total surface water supplies will be much less than demands. Much additional precipitation is needed to restore reservoirs to near normal operating levels after years of deficiency in runoff. Water supply outlook is near average for the Pecos and relatively good as compared to the Rio Grande.

COLORADO BASIN

Total effective snowpack on the upper Colorado River Basin in Wyoming, Colorado and New Mexico declined slightly during March to about 90 percent of average. The greatest deficiency is on the Green River in Wyoming. The water supply outlook improved last month on the Green River tributaries in Utah and a near average water supply is now anticipated. Flow of Colorado River tributaries in Colorado is expected to be near average with some slight excess in the Dolores and the upper San Juan. Except for possible late season shortages on smaller tributary streams, water supplies will be adequate in the upper Basin. Inflow to Lake Powell is forecast at 90 percent of average for the April-July 1968 period.

SELECTED STREAMFLOW FORECASTS APRIL-SEPTEMBER as of APRIL 1, 1968

STREAM AND STATION	1000 ACRE-FEET		PERCENT OF AVERAGE
	FLOW	FORECAST	
UPPER MISSOURI	1967	1968	
Jefferson at Sappington, Montana		1070	110
Madison near Grayling, Montana 1/	586	450	107
Gallatin near Gateway, Montana		595	133
Missouri near Zortman, Montana 2/		4680	104
Sun at Gibson Dam, Montana 3/	747	490	80
Marias near Shelby, Montana 4/	791	450	69
Milk near Eastern Crossing, Montana		210	84
Yellowstone at Livingston, Montana		2250	106
Shields at Clyde Park, Montana		130	132
Clark Fork at Chance, Montana		630	108
Shoshone, Inflow to Buffalo Bill Res., Wyo.		780	98
Wind at Dubois, Wyoming		95	98
Bull Lake near Lenore, Wyoming		152	86
Tensleep near Tensleep, Wyoming	121	67	93
Yellowstone at Miles City, Montana 5/		5950	103
Missouri near Williston, N. Dakota 6/		11200	102
PLATTE			
North Platte at Saratoga, Wyoming		630	108
Laramie near Jelm, Wyoming 7/		118	105
Clear at Golden, Colorado		127	95
St. Vrain at Lyons, Colorado		75	94
Cache LaPoudre near Fort Collins, Colorado 8/		175	96
ARKANSAS			
Arkansas at Salida, Colorado 9/		265	77
Purgatoire at Trinidad, Colorado		40	89
RIO GRANDE			
Rio Grande near Del Norte, Colorado 10/		510	104
Conejos near Mogote, Colorado 11/		185	94
Rio Chama near LaPuente, New Mexico		185	86
Rio Grande at Otowi Bridge, New Mexico 12/		600	99
Pecos at Pecos, New Mexico *		65	122
UPPER COLORADO			
Colorado near Granby, Colorado 13/		235	101
Colorado near Glenwood Springs, Colorado 14/		1450	90
Roaring Fork at Glenwood Springs, Colorado 15/		700	92
Gunnison at Grand Junction, Colorado		1225	94
Dolores at Dolores, Colorado		310	119
Colorado near Cisco, Utah	2241	3700	98
Green below Flaming Gorge Res., Utah 16/	1516	810	72
Yampa at Steamboat Springs, Colorado		275	94
White at Meeker, Colorado		332	100
Duchesne near Tabiona, Utah 17/		108	95
Rock Creek near Mountain Home, Utah		92	90
Price near Scofield, Utah 18/		42	114
Green at Green River, Utah 16/	3934	2690	80
San Juan Inflow to Navajo Res., N. M.		710	102
Animas at Durango, Colorado		460	101
San Juan near Bluff, Utah 19/	762	1175	100
Colorado, Inflow to Lake Powell, Arizona 20/	6045	6900	90
LOWER COLORADO			
Gila near Solomon, Arizona (Apr-May)	8	104	267
Salt at Intake, Arizona (Apr-May)	29	305	212
Verde above Horseshoe Dam, Arizona (Apr-May)	26	40	83

SELECTED STREAMFLOW FORECASTS APRIL-SEPTEMBER 1968 as of APRIL 1, 1968

STREAM AND STATION	1000 ACRE-FEET		PERCENT OF AVERAGE
	FLOW	FORECAST	
	1967	1968	
GREAT BASIN			
Bear at Harer, Idaho		210	80
Logan near Logan, Utah 21/	151	105	79
Ogden, Inflow to Pine View Res., Utah 22/**	138	85	74
Weber near Oakley, Utah	167	114	93
Inflow to Utah Lake, Utah		270	96
Big Cottonwood near Salt Lake City, Utah	45	36	92
Beaver near Beaver, Utah	30	26	107
South Fork Humboldt near Elko, Nevada	72	22	37
Humboldt at Palisades, Nevada	200	45	26
Truckee at Farad, California 25/	550	200	71
East Carson near Gardnerville, Nevada	309	120	67
West Walker near Coleville, California	236	90	64
UPPER COLUMBIA			
Columbia at Revelstoke, British Columbia	24860	22000	109
Kootenai at Wardner, British Columbia	5525	4200	87
Kootenai at Leonia, Idaho	10069	7110	76
Flathead near Columbia Falls, Montana 26/	6972	5050	78
Flathead near Polson, Montana 26/	7687	6000	77
Clark Fork above Missoula, Montana	2061	1810	99
Bitterroot near Darby, Montana	575	550	94
Clark Fork at Whitehorse Rapids, Montana 26/		11530	80
Columbia at Birchbank, British Columbia 26/**	51557	34700	98
Spokane at Post Falls, Idaho 27/		2250	66
Columbia at Grand Coulee, Washington 26/	73507	64860	92
Okanogan near Tonasket, Washington	1818	1720	88
Chelan at Chelan, Washington 28/	1366	1280	95
Wenatchee at Peshastin, Washington	1700	1460	86
SNAKE			
Snake above Palisades Res., Wyoming 29/		2270	90
Snake near Heise, Idaho 29/	4120	3500	90
Henry's Fork near Rexburg, Idaho 30/	1425	605	99
Big Lost near Mackay, Idaho 31/	291	140	92
Big Wood, Inflow to Magic Res., Idaho 32/(Mar-July)	466	130	47
Bruneau near Hot Springs, Idaho		135	63
Owyhee Res., Net Inflow, Oregon (Apr-July)	353	50	14
Boise near Boise, Idaho 33/	1419	980	60
Malheur near Drewsey, Oregon		28	34
Payette near Horseshoe Bend, Idaho 34/	1788	1450	73
Snake at Weiser, Idaho		4000	58
Salmon at Whitebird, Idaho	7400	6000	86
Clearwater at Spalding, Idaho	8106	7200	78
LOWER COLUMBIA			
Grande Ronde at LaGrande, Oregon	155	45	22
Yakima at Cle Elum, Washington 35/		600	57
Deschutes at Benham Falls, Oregon 36/		312	49
Columbia at The Dalles, Oregon 26/	108327	95000	87
Hood near Hood River, Oregon 36/		194	51
Willamette at Salem, Oregon 36/		3800	68
Lewis at Ariel, Washington 37/		1110	77
Cowlitz at Castle Rock, Washington	2436	2210	75

SELECTED STREAMFLOW FORECASTS APRIL-SEPTEMBER 1968 as of APRIL 1, 1968

STREAM AND STATION	1000 ACRE-FEET		PERCENT OF AVERAGE
	FLOW	FORECAST	
	1967	1968	
NORTH PACIFIC COASTAL			
Dungeness near Sequim, Washington		135	76
Rogue at Raygold, Oregon	898	650	65
Klamath Lake, Net Inflow, Oregon	607	375	59
CALIFORNIA CENTRAL VALLEY 38/**			
Sacramento, Inflow to Shasta, California	2760	1620	93
Feather near Oroville, California	3042	1500	81
Yuba at Smartville, California	1734	900	83
American, Inflow to Folsom Res., Calif.	2302	900	68
Cosumnes at Michigan Bar, California	333	75	58
Mokelumne, Inflow to Pardee Res., Calif.	831	270	58
Stanislaus, Inflow to Melones Res., Calif.	1340	450	63
Tuolumne, Inflow to Don Pedro Res., Calif.	2175	740	63
Merced, Inflow to Exchequer Res., Calif.	1232	350	58
San Joaquin, Inflow to Millerton Lake, Calif.	2327	690	59
Kings, Inflow to Pine Flat Res., California	2277	620	54
Kaweah, Inflow to Terminus Res., California	609	140	54
Tule, Inflow to Success Res., California	164	32	57
Kern, Inflow to Isabella Res., California	924	290	69

Forecasts in California provided by Department of Water Resources.
Average is for 1948-62 period except California. California is computed for 1916-65 period.
Forecasts assume average Effective Climate Conditions from Date Through Snow Melt Season.

Explanatory Notes on Forecasts listed on Inside Back Cover.
** April - June Period ** April - July Period*

Storage in Lake Mead and upper Colorado River Storage Project Reservoirs is comparable to a year ago but less than half of capacity. The outlook is for similar or perhaps less storage a year from this date.

In the lower Colorado River drainage, this is the third year of far above average surface water supply in central Arizona. Since the unusually heavy snow storm in December, snowmelt runoff has been well above average. Storage in Salt River reservoirs is near capacity, and San Carlos Reservoir has the most water in storage in 26 years and approaches the 800,000 acre-foot record established in 1942. On the Salt and Gila there is a substantial amount of snow remaining at higher elevations. On the Verde the peak of snowmelt runoff has already occurred, and April 1 snowpack is slightly below average. The present outlook indicates that there will be a substantial carryover for the 1969 water year.

GREAT BASIN

Water supply outlook in the Great Basin section of Utah is good to excellent for 1968. Some shortages are in prospect for smaller tributary streams in Rich and Cache counties in northern Utah where reservoir storage is not available. Forecasts on these smaller streams range from one-half to three-quarters of normal. Storage in major irrigation reservoirs is 120 percent of average with relatively higher storage in Utah and Bear Lake. Storage on the Sevier watershed is near average. The flow of all streams in southern Utah including the Sevier is forecast at 110 percent of average or higher.

In Nevada water supply outlook ranges from very poor on the upper Owyhee and Humboldt River, near average on the East Slope of Sierra streams in western Nevada to above average for the Virgin River in southern Nevada. All streamflow forecasts are for below average flow except for the

Virgin, but carryover storage is very favorable on the Truckee, Carson and Walker rivers. Storage in Rye Patch on the Humboldt is slightly below average.

COLUMBIA BASIN

The principal water producing areas of the main Columbia River Basin in Canada had near average snow cover on April 1--above average at high elevations and less than average at medium and lower elevations. The upper Kootenai has less than average snowpack at all elevations. Total snowpack and prospective flows from this section of the Basin is much less than for this date in 1967. Less than average streamflow is in prospect for the United States section of the Basin including tributaries in western Montana and the Snake River system in Idaho. Over most of Oregon snowfall is near a minimum of record and irrigation water shortages will be widespread for areas with inadequate storage.

The British Columbia Water Resources Service reports that April 1 snow surveys and related quantitative forecasts indicate that a close to average runoff volume should be expected at most British Columbia gaging stations in 1968. Deviations from this pattern include below average runoff predictions for the Kootenai and Peace rivers and for the inflow to Okanogan and Powell Lakes, and above average inflow to Nechako Reservoir. The Alaska and British Columbia snow surveys in the Yukon and Taku area also show below average snowpack.

The snow line elevation is unusually high for this time of year. Low and medium elevation snow is below average while high elevation snow is above average except for the Kootenai where snowpack is deficient at all elevations. Peak flows during the snowmelt period should not exceed average with any reasonable weather pattern.

In western Montana snowpack decreased further in relation to average during March. High elevation snow is much better than that at medium and lower elevations with the high elevation snow near average. The lower elevation snow has melted during the past month contributing to an above average current streamflow. Except for near average forecasts of snowmelt season streamflow on the upper Clark Fork and Bitterroot rivers, most streamflow is now expected to be in the range of 70-85 percent of normal. Power reservoirs will refill and no irrigation water shortage is expected for this area.

Streamflow prospects on Columbia River tributaries in Washington as well as on coastal streams deteriorated further during March. The best or near normal streamflow prospects remain on streams flowing east from the Cascades from the Wenatchee north to the Canadian Border and including the Okanogan. The flow of the Yakima, Lewis and Cowlitz rivers flowing into the lower Columbia River will range from 50 to 70 percent of average during the snowmelt season. All power and irrigation reservoirs will fill. The Yakima irrigation reservoirs are already approaching capacity. Irrigation water shortages will occur on small streams in southeastern Washington near Walla Walla.

During March, Idaho snowfall was below normal and temperatures were near a record high. Mountain snow cover ranges generally from 70 to 80 percent of average but varies from 9 percent on the low elevation Palouse watershed to 113 percent on the Blackfoot River in the southeast.

Forecasts of snowmelt season flow range from 50 percent of average on the Big Wood River up to near 90 percent of average on the Upper Snake and its tributaries. The larger rivers with storage facilities such as the Snake, Boise and Payette will have an adequate water supply by drawing on storage. Water users on smaller streams, mostly southern tributaries to the Snake, without storage will be critically short of water if weather during the irrigation season is near normal. Stored water is already being used for irrigation because of the lack of spring rainfall in March.

Forecasts of near record low streamflow forecasts for much of Oregon in the summer of 1968 indicates an extremely short water supply for most lands except those with adequate stored water. Most irrigated lands depending on diversions from natural streamflow will have only one irrigation at best--some lands will have not irrigation. The most serious water shortages are in prospect for tributaries of the Deschutes and adjacent streams in north central Oregon and lands under Fish Lake and Four Mile Lake in southwestern Oregon. The Warm Spring and Vale Irrigation Districts are also close to the point of prospective water shortages. Higher flows of 75 to 85 percent of average within the state are forecast for the Wallowa Mountains in the northeast.

ALASKA

Warm dry weather persisted throughout Alaska for the entire month of March. Normal snowfall was not received and many areas lost a substantial portion of the accumulated snowpack to melting and evaporation.

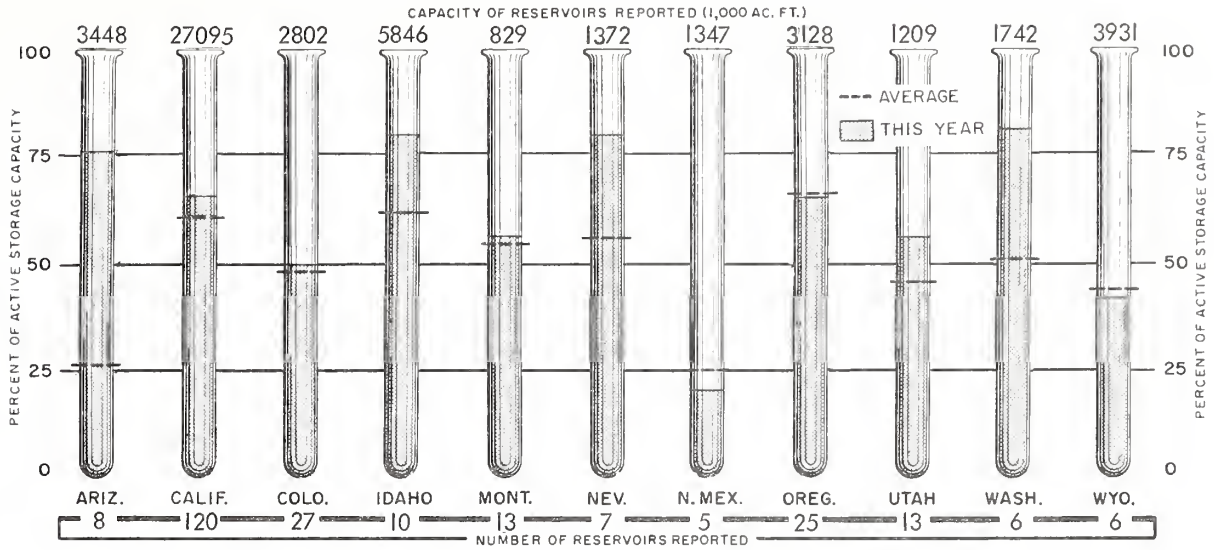
STORAGE IN LARGE RESERVOIRS APRIL 1, 1968

BASIN AND NAME OF RESERVOIR	CAPACITY (1000 A.F.)	STORAGE (1000 A.F.)
UPPER MISSOURI		
Boysen	560	299
Buffalo Bill	373	109
Canyon Ferry	2043	1430
Hebgen	377	237
Tiber	1316	422
Yellowtail	1356	759
Belle Fourche	185	143
Keyhole	340	120
Fort Peck	19410	16140
Fort Randall	5800	3752
Garrison	24500	18830
Oahe	23600	19776
Big Bend	1900	1725
PLATTE		
Glendo	786	405
Pathfinder	1011	370
Seminoe	982	222
City of Denver (5)	588	414
Colo-Big Thompson (4)	865	374
ARKANSAS		
Conchas	280	185
John Martin	367	43
RIO GRANDE		
Elephant Butte	2207	298
El Vado	194	1
UPPER COLORADO		
Flaming Gorge	3789	2061
Navajo	1709	598
Powell	28040	7850
Blue Mesa	941	347
LOWER COLORADO		
Havusu	619	551
Mead	27207	14640
Mohave	1810	1669
San Carlos	1206	637
Salt River Res. (4)	1755	1719
Verde River Res. (2)	323	310
GREAT BASIN		
Bear	1421	1127
Lahontan	287	258
Rye Patch	172	72
Sevier Bridge	236	107
Strawberry	265	131
Tahoe	732	632
Utah	884	796

BASIN AND NAME OF RESERVOIR	CAPACITY (1000 A.F.)	STORAGE (1000 A.F.)
UPPER COLUMBIA		
Chelan	676	437
Coeur d'Alene	238	156
Flathead	1791	889
Hungry Horse	2982	2215
Kootenay	817	162
Pend Oreille	1155	882
Roosevelt	5232	585
LOWER COLUMBIA		
Cougar	155	91
Detroit	299	213
Hills Creek	200	131
Lookout Point	377	188
Yakima Res. (5)	1066	964
SNAKE		
American Falls	1700	1538
Arrowrock	287	281
Anderson Ranch	423	284
Brownlee	1427	1206
Cascade	653	349
Jackson	847	607
Lucky Peak	278	162
Palisades	1202	1058
Owyhee	715	461
PACIFIC COASTAL		
Clair Engle	2448	2091
Clear Lake	440	219
Ross	1202	1154
Upper Klamath	584	479
Nacimiento	35	199
CALIFORNIA CENTRAL VALLEY		
Almanor	1036	835
Berryessa	1602	1616
Folsom	1010	652
Isabella	570	205
McClure	1026	647
Millerton	521	232
Oroville	3484	1486
Pine Flat	1013	656
Shasta	4500	3798

Reservoir Storage Data Provided by Bureau of Reclamation, Corps of Engineers, Geological Survey, and water using organizations. Data from California and British Columbia provided by Department of Water Resources and Department of Lands, Forests and Water Resources, respectively.

RESERVOIR STORAGE AS OF APRIL 1, 1968



Snow cover on the Chena watershed was considerably greater than normal at the beginning of March, but just average at the end. Near average snow cover also exists on the drainage of the Upper Yukon, Tanana and most of the other interior Alaska rivers. Exceptions to this are the Susitna, the Koyukuk and portions of the Chandalar where snowpack is considerably above average.

Some snowfall was received in the coast range mountains during the month, but snow cover in southeast Alaska is generally less than average.

CALIFORNIA

The California Department of Water Resources, coordinating agency for snow surveys in California, reports that the water supply outlook is for below average runoff in most areas of the State. Snowmelt runoff from Sierra-Nevada and Cascade watersheds will vary from about half of average in the Southern San Joaquin Valley to near average in the Northern Sacramento Valley. Although the below average snowpack has reduced spring runoff potential in some areas to dry year conditions, storage in major reservoirs is normal or above for this date in all areas; thus, no critical water shortages are anticipated.

Forecasts of April-July runoff for tributaries to the Central Valley are reduced from those reported one month ago. Assuming average precipitation through the forecast period, April 1 forecasts for the Sacramento and San Joaquin Valleys are 80 percent and 60 percent of average, respectively. Water year runoff forecasts for California's major streams now average 80 percent of normal.

The vagaries of California weather were again aptly demonstrated during March. Precipitation was below normal in all high elevation watersheds of the Central Valley except for the Kern River which experienced near normal amounts. However, it was near and above normal on the floor of the Central Valley and in San Francisco Bay and South Coastal areas, and was well above normal in the Colorado Desert area. Temperatures were generally above normal during the month except in the third week when they were a degree or two below normal in most of the State. Positive departures were about 5 degrees, half the positive departures experienced during the latter half of February.

As of April 1, the seasonal precipitation to date was about 80 percent of normal. In Southern California, precipitation to date was 85 percent of normal, still reflecting three prior months of very light rainfall in the area.

Precipitation to date varies between 70 and 90 percent of normal in the Sierra drainages of the Sacramento Valley, and between 55 and 80 percent in the San Joaquin Valley basins.

April 1 snowpack measurements indicated that during March the normal snowpack accumulation was not realized in the mountainous watersheds, except for the Kern River Basin in the Southern San Joaquin Valley and McCloud River Basin in the Upper Sacramento Valley. April 1 snow surveys showed California's snowpack water content was 70 percent of normal for that date. In Central Valley watersheds, the water content of the pack ranged from 55 percent of normal for the San Joaquin River Basin to 92 percent of normal for the Feather River Basin in the north.

March runoff for California's major streams was substantially below average except in the northern portion of the State and Lahontan area. Sacramento Valley streams experienced 93 percent of normal runoff for the month but, in the San Joaquin Valley, streamflow was only 68 percent of normal. Runoff for the period October 1 - March 31 of California's major streams was 90 percent of average with only the Lahontan area above normal at 120 percent. In Central Valley watersheds, October through March runoff was 88 percent of average, generally ranging between 70 percent of normal for most San Joaquin Valley streams (noteworthy exceptions--the Kern River at 125 percent and the Merced at 50 percent), and near normal for Upper Sacramento Valley basins.

Based on April 1 storage reported for 120 major reservoirs, with a combined capacity of 27,095,000 acre-feet, the aggregate storage in California's reservoirs is 18,013,000 acre-feet, 110 percent of normal for this date. This represents a net increase of over 878,000 acre-feet in storage over that reported for these reservoirs last year.

EXPLANATION of STREAMFLOW FORECASTS

All flows are observed flows except as adjusted for: 1/ Change in storage in Hebgen Lake. 2/ Change in storage in Canyon Ferry and Tiber reservoirs. 3/ Change in storage in Gibson Reservoir and measured diversions. 4/ Change in storage in Two Medicine, Four Horns and Lake Francis reservoirs. 5/ Change in storage in Boysen and Buffalo Bill reservoirs.

6/ Change in storage in Boysen, Buffalo Bill, Canyon Ferry, Tiber, and Fort Peck reservoirs. 7/ Plus diversions to Cache la Poudre. 8/ Minus diversions from North Platte, Laramie, and Colorado rivers plus measured diversions above station. 9/ Change in storage in Twin Lakes and Sugar Loaf reservoirs minus diversions from Colorado River.

10/ Change in storage in Rio Grande, Santa Maria, and Continental reservoirs. 11/ Change in storage in Platoro Reservoir. 12/ Change in storage in El Vado Reservoir. 13/ Change in storage in Granby Reservoir plus diversions to Cache la Poudre and through Adams Tunnel. 14/ Changes as indicated in (13) plus Moffatt Tunnel diversion. 15/ Plus diversions to Arkansas River.

16/ Change in storage in Flaming Gorge and Big Sandy reservoirs. 17/ Plus diversion through Duchesne Tunnel. 18/ Change in storage in Scofield Reservoir. 19/ Change in storage in Navajo Reservoir. 20/ (Lee's Ferry) Change in storage in Flaming Gorge, Navajo, Lake Powell, and Big Sandy reservoirs.

21/ Plus Utah Power and Light Company tailrace and Logan, Hyde Park, and Smithfield canals. 22/ (Inflow record computed by U. S. Bureau of Reclamation.) 23/ Plus diversion by Weber-Provo Canal and change in storage in Wanship Reservoir. 24/ Change in storage in Deer Creek Reservoir, minus diversions through Duchesne Tunnel and Weber-Provo Canal, plus diversion through Salt Lake City Aqueduct. 25/ Change of storage in Lake Tahoe and Boca Reservoir. (Forecast by Truckee Basin Committee)

26/ Change in storage in any of these reservoirs above the station: Kootenai Lake, Hungry Horse, Flathead Lake, Pend Oreille Lake, F. D. Roosevelt Lake, Lake Chelan, Coeur d'Alene Lake, Brownlee and Noxon; and pumpage at Roosevelt Lake. 27/ Changes in storage in Coeur d'Alene Lake and diversions by Spokane Valley Farms Company and Rathdrum Prairie canals. 28/ Change in storage in Lake Chelan. 29/ Changes in storage for Jackson Lake and Palisades Reservoir above stations. 30/ Change in storage in Henry's Lake, Island Park and Grassy Lake reservoirs and diversions between Ashton and Rexburg.

31/ Change in storage in Mackay Reservoir, and diversion in Sharp Ditch. 32/ (Combined flow Big Wood River nr. Bellevue and Camas Creek nr. Blaine.) 33/ Change in storage in Arrowrock, Anderson Ranch, and Lucky Peak. 34/ Change in storage in Cascade and Deadwood reservoirs. 35/ Change in storage in Keechelus, Kachess, and Cle Elum reservoirs plus diversion by Kittitas Canal. 36/ (Corrected to natural flow). 37/ Change in storage in Merwin, Yale, and Swift reservoirs. 38/ (Corrected for upstream impairments).

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